

REMARKS

Claims 4 and 11 have been amended to correct informalities identified by the examiner.

As requested by the examiner, the Applicant encloses an English translation of JIS P 8143.

All claims now being in condition for allowance, applicant requests the issuance of a Notice of Allowance.

Respectfully submitted,



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JIS

JAPANESE INDUSTRIAL STANDARD

**Paper—Determination of stiffness
by Clark stiffness tester**

JIS P 8143—1996

Translated and Published

by

Japanese Standards Association

JAPANESE INDUSTRIAL STANDARD

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Paper—Determination of stiffness
by Clark stiffness tester

P 8143-1996

1. Scope This Japanese Industrial Standard specifies a method for determining the stiffness of paper using Clark stiffness tester.

Remarks: The following standards are cited in this Standard:

- JIS B 7516 Metal rules
- JIS P 0001 Glossary of terms used in pulps and papers industry
- JIS P 8110 Paper and board – Sampling for testing
- JIS P 8111 Conditioning of paper and paperboard for test
- JIS Z 8401 Rules for rounding off of numerical values
- JIS Z 9041 Presentation and reduction of data

2. Definitions For the purpose of this Standard, in addition to the definitions specified in JIS P 0001, the following definitions apply:

- (1) critical rotation angle The rotation angle at the time when the test piece is just turned over, in such a procedure that the test piece is gripped horizontally at its lower end with the longer side direction being vertical and rotated around the axis of gripping line.
- (2) critical length The stretching length of the test piece at the time of critical rotation angle of $90 \pm 2^\circ$.
- (3) stiffness (Clark) The value obtained by dividing the third power of critical length (cm) by 100. It means the resistance of the paper against the bending due to its own weight and the index of the hanging of paper.

3. Apparatus and instrument Apparatus and instrument shall be as follows:

- 3.1 Tester The tester shall be as follows (see Fig. 1):

- (1) The gripping device shall be able to grip one end of shorter side of the test piece between two parallel and horizontal rollers, and adjust the stretching length of the test piece. The diameter of the roller shall be 29.0 ± 1.0 mm.
- (2) The gripping device shall be able to rotate at a speed of 1.0 ± 0.1 revolutions per minute (15 ± 1.5 s for revolution of 90°) around the axis of the line tangential to two rollers.
- (3) The rotation angle of the grip can be indicated in the precision within 1° .

Informative reference: The pointer and angle graduation plate in Fig. 1 are provided for this purpose.

- 3.2 Rule The 300 mm metal rule of grade 1 specified in JIS B 7516.

- (6) Repeat the operations in (4) and (5) and adjust the stretching length of the test piece so that the test piece turns down to the opposite side when the grip is rotated approximately 90°.
- (7) Rotate the grip at the speed of 1.0 ± 0.1 revolutions per minute and adjust the stretching length of the test piece so that the test piece turns down to the opposite side at the rotation angle of the grip of $90 \pm 2^\circ$. At this time, measure the stretching length L (critical length) of the test piece from the tangential line of roller in the unit of 0.1 cm with a rule.
- (8) Measure five test pieces taken in each of machine direction and cross direction.

- Remarks
1. The tests specified in (1) to (6) are considered as preliminary tests and the test in (7) as the main test for measuring the stretching length of the test piece L .
 2. The adjustment of the stretching length of the test piece should be done in such a way that the longer one is shortened in order to avoid the influence of the deformation of the test piece caused by the pressure of the roller on the stiffness (Clark).
 3. When setting up a standard preparatorily for the critical length, calculate it by the following formula:

$$L = \frac{(90 - \alpha_2) \times (L_1 - L_2)}{\alpha_1 - \alpha_2} + L_2$$

where, L : critical length (cm)

L_1 : stretching length of test piece at rotation angle of 100° to 130° (cm)

L_2 : stretching length of test piece at rotation angle of 50° to 80° (cm)

α_1 : critical rotation angle at the time of L_1 (°)

α_2 : critical rotation angle at the time of L_2 (°)

4. When the air-flow affects the measured value, the tester shall be enclosed by windshield.

6. Calculation

The stiffness (Clark) shall be calculated by the following formula:

$$S = \frac{L^3}{100}$$

where, S : stiffness (Clark)

L : critical length (cm)

7. Expression of test result The average values in the machine direction and cross direction shall be obtained from the values of stiffness (Clark) calculated individually and rounded off to three places of significant figures in accordance with the method specified in JIS Z 8401.

The standard deviation shall be obtained in accordance with the method specified in JIS Z 9041.



P 8143-1996
Edition 1

Japanese Text

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